

WHAT IS CLAIMED IS:

1. A secondary balancer for an outboard motor-vertical in-line engine which includes a crankcase, a cylinder block and a cylinder head, which are arranged in this order from a hull side of a boat to which the outboard motor is mounted, a crankshaft disposed in the engine so as to extend in a substantially vertical direction, an intake pipe arranged on one side of the engine, a throttle body and an intake silencer, which are disposed on a front side of the crankcase in the engine, and a balancing device for eliminating vibration of the engine, said balancing device including a primary balancer and a secondary balancer, said second balancer comprising a pair of balancer shafts disposed in a space formed between the crankcase and the intake silencer.

2. A secondary balancer according to claim 1, wherein said secondary balancer is housed in a balancer shaft housing independently formed from the crankcase and mounted on an outer side of the crankcase.

3. A secondary balancer according to claim 2, wherein balancer shaft-gears for operatively connecting said pair of balancer shafts to each other are arranged in the balancer shaft housing, a balancer drive sprocket is provided at a lower end of the crankshaft, and a balancer driven sprocket is disposed at a lower end of one of the paired balancer shafts, said balancer driven

sprocket being operatively connected to the balancer drive sprocket by means of a balancer chain.

4. A secondary balancer according to claim 2, wherein bearing bosses for rotatably supporting the paired balancer shafts in the balancer shaft housing are disposed at positions corresponding, in a horizontal direction, to bearing portions formed on partition walls by which the engine is divided into a plurality of sections in a vertical direction, said bearing portions rotatably supporting the crankshaft.

5. A secondary balancer according to claim 4, wherein said bearing bosses are provided therein with oil supply passages for lubrication of the balancer shafts, said oil supply passages communicating with a main oil gallery of the engine through oil communicating passages, which are formed in the cylinder block and the partition walls of the crankcase.

6. A secondary balancer according to claim 1, wherein said pair of balancer shafts are placed in a position corresponding to a cylinder in the cylinder block which is disposed in a vertically middle portion of the crankshaft in a side view of the engine.

7. A secondary balancer according to claim 1, wherein a drive unit for rotating the balancer shafts is arranged at a lower portion of the crankshaft and the balancer shafts.

8. A secondary balancer according to claim 1, wherein a balancer shaft-drive gear is disposed on a crank-web, which is formed on the crankshaft and another balancer shaft-drive gear is disposed at a lower end of one of the paired balancer shafts, said one balancer shaft being disposed on an opposite side to the intake pipe arranged on the one side of the engine, relative to an axial line of a cylinder.

9. A secondary balancing device for an outboard motor-vertical in-line engine which includes a crankcase, a cylinder block and a cylinder head, which are arranged in this order from a front side of the engine, a crankshaft disposed in the engine in a substantially vertical direction, an intake pipe arranged on one side of the engine, a throttle body and an intake silencer, which are disposed on a front side of the crankcase, and a balancing device including a primary balancer and a secondary balancer, said secondary balancer comprising:

- a pair of balancer shafts arranged in a space formed between the crankcase and the intake silencer;

- a balancer shaft housing in which the pair of balancer shafts are received, said balancer shaft housing being independently formed from the crankcase and fixed on an outer side of the crankcase.

- a drive gear, for rotating the balancer shafts, disposed at a lower end of the crankshaft and the balancer shafts;

a balancer shaft-drive gear provided on a crank-web, which is formed to the crankshaft, and another balancer shaft-drive gear disposed at a lower end of one of the paired balancer shafts, said one balancer shaft being disposed on a side opposite to the intake pipe;

balancer shaft-gears, for operatively connecting the paired balancer shafts to each other, disposed inside the balancer shaft housing; and

bearing bosses, for rotatably supporting the paired balancer shafts in the balancer shaft housing, disposed in positions corresponding, in a horizontal direction, to bearing portions formed on partition walls by which the engine is divided into a plurality of sections in a vertical direction.

10. An outboard motor vertical in-line engine comprising:

a crankcase, a cylinder block and a cylinder head, which are arranged in this order from a hull side of a boat to which the outboard motor is mounted;

a crankshaft placed in the engine in a substantially vertical direction;

an intake pipe arranged on one side of the engine;

a throttle body and an intake silencer, both of which are disposed on a front side of the crankcase; and

a balancing device including a primary balancer and a secondary balancer, said secondary balancer being disposed in a space formed between the crankcase and the intake silencer, said

secondary balancer comprising a pair of balancer shafts.